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Inventory Taking

A science kit inventory introduces students to tools and vocabulary, paving the way for successful science experiences.

Imagine a science activity that excites native English speakers and English learners alike while simultaneously teaching students about tools used in science experiments, increasing science vocabulary, and improving students' skills in recording information. Sound too good to be true? It's not. Inventorying science kits or materials from science units with students does just that with resounding success.

Usually, a teacher's first step when presented with a science unit is to inventory the materials to verify that all products are there in the appropriate numbers—you don't want to be caught in the middle of an activity and find you do not have enough supplies. Most of the time, teachers conduct this routine task after school hours. However, why not let students do the inventory? We did, and we found the process to be a learning experience for both students and teachers. It was also useful in helping English learners build their vocabulary of academic language.

Here's a description of the activity.

Initiating the Inventory

To begin an inventory, the teacher presents science materials one at a time from the selected science unit, such as one on rocks and minerals, and asks students to describe each item's characteristics, make predictions about the item's function, and predict what kind of

science content or activity the item might support. For example, the teacher may hold up a strainer and ask, "What is this? Where might it be used besides a kitchen? What does it mean to strain?" This sequence of questions acknowledges what the students already know and encourages them to project their understanding in a new area. The teacher may also go through the same process with a paintbrush, goggles, spoon, and nail, asking students to predict the content of the upcoming unit of study. Items more central to the unit, such as the bags of mineral samples, may be saved until the end of the lesson or until the next day.

Later or the next day, the teacher shows any remaining items and reviews the materials shown previously. Then, reflecting on all of the items, the teacher asks students to make a final prediction about the focus of the unit. For example, asking, "Why would the kit contain pennies, nails, and paper plates?" Students may respond, "They are tools to help us study rocks." When making a prediction, students are asked to provide the reasoning or evidence that backs up their claims.

When all of the materials are revealed, students can usually correctly predict the unit content and congratulate themselves when the teacher reveals the name of the unit. A materials inventory lesson may take 20 to 30 minutes, depending on the number of items and their uniqueness.

Figure 1.**Sample conversation: Earth materials inventory, day 1.**

Item	Teacher	Student
Goggles	What are these? (holding them up)	Goggles
	Do you know what these are made of?	Plastic
	Where have you seen them before?	At the swimming pool
	Why do people have them at the swimming pool?	To cover their eyes
	Why do you think they are in our science kit?	Are we going swimming?
Penny	Do you know what this is?	It's a penny
	A penny is what?	Money, coin
	Why do you think this is in our science kit?	Maybe we have to buy something
	Can you describe the penny for me?	Orangey; round; flat; has a picture
Paper Plates	What are these? Where have you seen them before?	Paper plates; At a picnic
	What shape are they?	Square
	Do you have any ideas or any predictions about what we might be studying?	Maybe we will make a mask from the paper plate
	And how will we use the penny or goggles?	To put on the outside of the mask.
Ceramic Tiles	I found these little tiny things in our science kit. What shape are they?	Round
	Can you tell me how they feel?	Rough; sandy; sand paper
	So what do you think these are called?	Tiles
	Where have you seen them before?	In the bathroom
	Tell me what the tile and the penny have in common, what is the same about them?	They are hard; they have shapes
Nail	I know you have seen this before, can you tell me what it is called?	A nail
	Where do you normally see these?	When we are building
	What do you do with a nail?	Pound it; Hit it; Put it in wood
	Look at this nail, the ends are different. Can you tell me about them?	One end is flat and the other is pointy; sharp
	Do you have any ideas or any predictions about what we might be studying?	Maybe building
Paper Clips	Look at this box, do you know what is in here?	Paper clips
	Why do we have paper clips in our kit?	To hold paper together
	Before we stop for today, what do we think we are going to be doing in science?	I think we are building; Me too.

Revealing Prior Knowledge

Students' predictions about the kit's contents reveal their prior knowledge of the upcoming topic. For example, in the Earth Materials inventory described in Figures 1 (above) and 2 (page 32), it was evident that some students knew the names and functions of the items, but it can't be assumed that because one student answered, that all students knew, especially in a classroom with English learners.

Even though English learners may not know the name of some items in English, they may be fa-

miliar with the item and its function. For example, a strainer provides an excellent example of how students may be familiar with a concept but in a different context. This was evident when a student told about his uncle in Mexico who sifts sand through a screen, in order to remove the rocks and get it ready for mixing concrete.

Also, students' statements about the objects in the kit can reveal misconceptions about the items or the content of the unit or students' limitations with the

English language, especially when faced with words with multiple meanings. The teacher can either address these immediately or keep track of them and address them in future lessons of the unit. For example, when a teacher mentions a nail without a visual cue, an English learner can easily conceptualize a fingernail instead of a nail used in carpentry. A misconception can occur, for example, when the teacher asks students about the composition of an ice cube and they respond that it is water and therefore a liquid. The teacher can take the opportunity to explain that it is a solid, describing its properties.

Some students may have limited prior knowledge or vocabulary and will not be able to identify even common items. This will be evident as students conduct the inventory assignment; if this occurs, teachers can then modify instruction to make sure all students know the names and functions of the tools they will be using. To help this student,

the teacher might say, “This is a pebble. Who can tell me something about a pebble? Can you hold a pebble in your hand? How many pebbles would fit in this box? Where are there pebbles on our playground?” In each question, the teacher stresses *pebble*, the new vocabulary word.

As they conduct the inventory, students may also begin to classify objects and see relationships among them. Teachers can ask students to group items by categories, such as items that contain things, are used to measure, or are made from rocks.

Developing Science Vocabulary

An inventory provides English learners with an introduction of vocabulary directly related to content. They can also see, touch, and smell the items. This helps students retain the information and knowledge about the items presented as well as the representations used

Figure 2.

Sample conversation: Earth materials inventory, day 2.

Item	Teacher	Student
Salt	What is this called? What is it used for?	Salt; Cooking
Eyedropper	What is this called? What is it used for?	Eyedropper; Giving medicine
Chalk	Can you describe this for me?	Hard; white; powdery
	What does it look like when you break it in half?	The same; chalk inside too
	What does it feel like? What happens when you hold it in your hand?	They get white; they get dirty; powdery
	Now what do you think we are going to study?	Building; Cooking; Drawing
Flour	Do you know what this is called? What is it used for?	Flour; Cooking
Marble	What is in this bag? What does it feel like?	Rocks; Hard, whitish
Sandstone	What is inside of this bag?	More rocks
	Do they look the same as the other ones?	They are different colors; they are the same size
	Feel these rocks. How do they feel?	Sandy; rough
Calcite	Look, what is this?	Rock
	Is it the same as the first ones?	It's clearer; it has flat sides
Gypsum	Here is a different sample. What does it look like?	White; powdery
	What thing from our inventory is it similar to?	The chalk
	What do you think we are going to study?	Rocks
	Why do you think so?	Because there are many rocks in the kit.
	Why would the kit contain pennies, nails, and paper plates?	They are tools to help us study rocks.
Conclusion	The name of the unit is Earth Materials. Do you think we might study rocks in this unit? Why?	Yes; rocks are part of the Earth; the other things are the materials to help us study them.

Day 2 of the inventory begins with a review of the materials and predictions discussed the previous day. Then, the teacher introduces the rest of the materials required for the study.

for these items: both the names for the items that they can use orally and the written words.

Initially, students may refer to common items by the name used in everyday language (i.e., “measuring cup”). Doing a materials inventory provides an opportunity for the teacher to introduce the scientific name (“beaker”) of the item for the benefit of all students.

The second day of the lesson (Figure 2) is especially important because language learners need to use new vocabulary multiple times before it becomes an integral part of their language base. By reviewing the various items, getting to know the names of each item, and discussing their function, students will be in a better position to understand the content. Without this vocabulary they may have to interrupt the flow of a lesson to ask questions about items, such as “What are goggles?” When this happens, the important safety issues the teacher was relating about the use of goggles may be lost.

The materials inventory can also expand the science vocabulary knowledge of English speakers at many grade levels. In kindergarten, students can match unit materials to appropriate pictures or labels.

Second-grade students can focus on all four modes of linguistic development in the lesson (listening, speaking, reading, and writing). After the teacher or student identifies items orally, students describe the item in writing and read their sentences to the class.

Older students have even more opportunities to develop science vocabulary. Throughout a unit on electricity, discussion words like *aluminum foil*, *conductor*, *steel wool*, *copper*, and *electricity* are added to a word chart. This helps students focus on central vocabulary words and, for English learners, provides the written cues to help them comprehend what the teacher is saying, participate in discussions, and accurately write their findings.

Seeing the word written is crucial because English learners often have difficulty distinguishing sounds that differentiate words unfamiliar to them. For example, when a teacher says “wire strippers,” the student may hear it as a single word, “wirestrippers” or separate it into “wires trippers.” The first would be undecipherable and the second may lead to erroneous associations. When seeing it written as two separate words, the student may already know one of the words or may be able to connect each of those two words with their meaning and surmise the meaning of the new word.

Drawing the item being described can also help English learners; visuals provide another clue to associate with the word’s meaning.

Final Thoughts

Another benefit we’ve seen from conducting inventories is an increase in student motivation and focus when

Connecting to the Standards

This article addresses the following *National Science Education Standards* (NRC 1996):

Teaching Standards

Standard A:

Teachers of science plan an inquiry-based science program for their students.

Standard B:

Teachers of science guide and facilitate learning.

Standard D:

Teachers of science design and manage learning environments that provide students with the time, space, and resources needed for learning science.

we get to the science lesson or activity. Students don’t “play” with the science tools as much during the content lessons when they have already had an opportunity to learn about and handle the instruments during the inventories. Some of the novelty is gone and students can then concentrate on the lessons.

Participating in an inventory lesson motivates students to participate fully in the unit of study. Students wonder about how certain items will be used and they try to make sense of it as they move along from item to item. This motivation is evident as other lessons follow and they see some of their favorite items once again. The anticipation is often palpable.

An inventory also allows teachers to frequently and quickly assess students’ understanding of the language of the unit by asking questions about each item, especially if they use a random system of calling on students. Another way to assess is to have students take a few minutes at the end of the inventory to ask their peers to identify new items by name and function, with the teacher circulating to check for student understanding.

Most importantly, inventories provide English learners with the tools to access the science concepts of the lesson. Teaching scientific vocabulary in conjunction with content instruction provides teachers with some strategies to lead English learners to greater academic success. ■

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Resources

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academy Press.